CLAIMS

1. A method for improving the accuracy and repeatability of Electrochemical Capacitance Voltage (ECV) profiling comprising the steps of:

Providing a sample, a means of defining a measurement region on the sample, an electrochemical cell to contain the electrolyte which is in contact with the sample and ECV profiling in conventional manner;

monitoring the sample during the electrolyte fill cycle to observe the presence of gas bubbles formed thereon;

monitoring the etched well during profiling;

measuring the etched well area at the end of the profile;

applying the said measurements to the raw profiling data to produce adjusted data more reproducibly representative of the ECV profile.

2. A method in accordance with claim 1 wherein a suitable optical system is used which can be combined with the ECV profiling apparatus to both monitor the etched well during filling and profiling and accurately measure the well area once the profiling is complete, without removing the sample from the apparatus.

3. A method in accordance with claim 1 or claim 2 wherein the steps of observation and measurement of the etched well comprise the use of a light source of above band-gap energy, to illuminate the sample, and the use if image collection means to collect a reflected light image from the sample and image analysis means to analyse the reflected light image from the sample and obtain the said measurements from the etched well.

4. A method in accordance with claim 3 wherein the image collection means comprises digital imaging means and/or incorporates means to digitise the image for subsequent analysis by the image analyser.

5. A method in accordance with claim 3 or claim 4 wherein the reflected light image is directed towards the imaging means by use of suitable directing means such as a beam splitter.

6. A method in accordance with one of claims 3 to 5 wherein the same light source and imaging means are used to view and monitor the cell during the electrolyte fill cycle and the etched well area subsequently, in that the method comprises using the light source to generate a reflected light image of the cell during the electrolyte fill cycle and collecting the image via the imaging means, draining the electrochemical cell, taking the cell out of the optic path, using the light source to generate a reflected light image of the etched well area, and collecting the image via the imaging means to measure the said area.

7. A method in accordance with any preceding claim wherein the step of monitoring the sample during the electrolyte fill cycle comprises the step of obtaining a measurement of gas bubble formation thereon and using this measurement to provide automatic feedback for elimination of gas bubbles and/or to further adjust the raw profiling data to produce data more reproducibly representative of the ECV profile.

8. An apparatus for improving the accuracy and repeatability of Electrochemical Capacitance Voltage (ECV) profiling comprises means to monitor a sample during the electrolyte fill cycle to observe the

presence of gas bubbles and surface films formed thereon, means to monitor the etched well during profiling, means to obtain a measurement of the etched well area at the end of the profile, whereby the said measurements may applied to raw profiling data to produce adjusted data more reproducibly representative of the ECV profile.

9. Apparatus in accordance with claim 8 wherein a suitable optical system is provided to obtain the said measurements.

10. Apparatus in accordance with claim 9 wherein a single optical system is provided, adapted for use in combination with the ECV profiling apparatus to both monitor the etched well during the measurement and accurately measure the well area once the measurement is complete, without removing the sample from the apparatus.

11. Apparatus in accordance with claim 10 wherein the means to monitor a sample during the electrolyte fill cycle, the means to monitor the etched well during profiling, and the means to obtain a measurement of the etched well comprises a single optical system including a light source of above band-gap energy to illuminate the sample, image collection means to collect a reflected light image from the sample and image analysis means to analyse the reflected light image from the sample and obtain the said measurements.

12. Apparatus in accordance with any one of claims 8 to 11 wherein the light source is a quartz halogen light source.

13. Apparatus in accordance with any one of claims 8 to 12 wherein the image collection means comprises digital imaging means and/or

incorporates means to digitise the image for subsequent analysis by the image analyser.

14. Apparatus in accordance with claim 13 wherein the imaging means comprises a CCD camera.

15. Apparatus in accordance with any one of claims 8 to 14 wherein the analysing means comprise a suitable computer programmed with suitable analysis software.

16. Apparatus in accordance with claim 15 wherein the imaging means is interfaced to the computer to pass a digitized image thereto for processing the said measurements and/or applying the measurements to raw profiling data in the manner of the invention using suitable analysis software.

17. Apparatus in accordance with claim 15 or 16 wherein the software is adapted to process the data from the image so as to extract the etched well area and in the case of a 'blue film slice' is able to differentiate between the wetted and illuminated areas, measure them and determine the excess area.

18. Apparatus in accordance with one of claims 15 to 17 wherein the image is processed using software to analyse the image and use the results of the analysis to provide automatic feedback for elimination of gas bubbles and surface films.

19. Apparatus in accordance with one of claims 8 to 18 further comprising a beam splitter to direct the reflected light image towards the imaging means.

20. Apparatus in accordance with one of claims 8 to 19 further including means to receive an electrochemical cell in the optical path of the imaging means during the electrolyte fill cycle, which are adapted to enable the cell to be removed from the optical path subsequently, so the same light source may be used to generate a reflected light image of the etched well area collecting the image via the imaging means to measure the said area.

21. Apparatus in accordance with one of claims 8 to 20 further comprising focussing means to compensate for the difference in focal length when the cell windows and electrolyte are in the path.

22. Apparatus in accordance with claim 21 wherein a fixed focus imaging means is provided, and a removable lens in the light path to the imaging means is provided to compensate for the difference in focal length.

23. Apparatus in accordance with one of claims 8 to 22 further comprising focussing means to focus the reflective image of the sample.

24. Apparatus in accordance with claim 23 comprising fixed focus imaging means, and wherein a mechanism is provided for moving the sample along the optical axis so that it focuses on the fixed focus imaging means.

25. Apparatus in accordance with one of claims 8 to 24 wherein the electrochemical cell is provided with a window for viewing and illuminating the sample, which is preferably slightly angled to prevent reflection from the surfaces of the window degrading the reflected image on the imaging means.

26. Apparatus in accordance with one of claims 8 to 25 further comprising a flip lens before the imaging means to correct for refraction by the electrolyte and cell window when the apparatus is being used to view and/or monitor gas bubbles and surface films.